RL/REG-99-08
Revision 1

PLANNING HANDBOOK
FOR
BNFL INC. DESIGN SAFETY FEATURES SUBMITTAL REVIEW

February 23, 1999

Office of Radiological, Nuclear, and Process Safety Regulation
of the TWRS-P Contractor

Richland Operations Office
Richland, Washington

Approved: _____
Regulatory Official

Date: _____

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PREFACE

The Department of Energy's (DOE) Richland Operations Office (RL) issued a request for proposal in February 1996 for privatized processing of waste as part of the Hanford Tank Waste Remediation System (TWRS). Offerors were requested to submit proposals for the initial processing of the tank waste at the Hanford Site. Some of this radioactive waste has been stored in large underground storage tanks at the Site since 1944. Currently, approximately 54 million gallons of waste containing approximately 250,000 metric tons of processed chemicals and 215 million curies of radionuclides are being stored in 177 tanks. These caustic wastes are in the form of liquids, slurries, saltcakes, and sludges. The wastes stored in the tanks are defined as high-level radioactive waste (10 CFR Part 50, Appendix F) and hazardous waste (Resource Conservation and Recovery Act).

Under the privatization concept, DOE intends to purchase waste processing services from a contractor-owned, contractor-operated facility through a fixed-price contract. DOE will provide the waste feedstock to be processed but maintain ownership of the waste. The contractor must: a) provide private financing; b) design the equipment and facility; c) apply for and receive required permits and licenses; d) construct the facility and commission its operation; e) operate the facility to process tank waste according to DOE specifications; and f) deactivate the facility.

The TWRS Privatization Program is divided into two phases, Phase I and Phase II. Phase I is a proof-of-concept/commercial demonstration-scale effort the objectives of which are to a) demonstrate the technical and business viability of using privatized contractors to process Hanford tank waste; b) define and maintain adequate levels of radiological, nuclear, process, and occupational safety; c) maintain environmental protection and compliance; and d) substantially reduce life-cycle costs and time required to process the tank waste. The Phase I effort consists of three parts: Part A, Part B-1, and Part B-2.

Part A is a twenty-month period to establish technical, operational, regulatory, and financial elements necessary for privatized waste processing services at fixed-unit prices. This includes identification by the TWRS Privatization Contractors and approval by DOE of appropriate safety standards, formulation by the Contractors and approval by DOE of integrated safety management plans, and preparation by the Contractors and evaluation by DOE of initial safety assessments. Of the twenty-month period, sixteen months is for the Contractors to develop the Part-A deliverables and four months is for DOE to evaluate the deliverables and determine whether to authorize Contractors to perform Part B. Part A culminated in DOE's authorization on August 24, 1998, of BNFL Inc. to perform Part B.

Part B-1 is a twenty-four month period to a) further the waste processing system design introduced in Part A, b) revise the technical, operational, regulatory, and financial elements established in Part A, c) provide firm fixed-unit prices for the waste processing services, and d) achieve financial closure.

Part B-2 is a sixteen year period to complete design, construction, and permitting of the privatized facilities; provide waste processing services for representative tank wastes at firm fixed-unit prices; and deactivate the facilities. During Part B-2, approximately 10% of the total Hanford tank wastes will be processed.

Phase II will be a full-scale production effort. The objectives of Phase II are to implement the lessons learned from Phase I and to process all remaining tank waste into forms suitable for final disposal.

A key element of the TWRS Privatization Program is DOE's regulation of radiological, nuclear, and process safety through the establishment of a specifically defined regulatory approach and a specifically chartered, dedicated Regulatory Unit (RU) at RL. This regulation is authorized by DOE through the document entitled *Policy for Radiological, Nuclear, and Process Safety Regulation of TWRS Privatization Contractors* (referred to as the Policy) and is implemented through the document entitled *Memorandum of Agreement for the Execution of Radiological, Nuclear, and Process Safety Regulation of the TWRS Privatization Contractors* (referred to as the MOA). The Policy is signed by the Under Secretary of Energy; the Manager, RL; the Assistant Secretary for Environment, Safety and Health (EH-1); and the Assistant Secretary for Environmental Management (EM-1). The MOA is signed by the Manager, RL; EH-1; and EM-1. The MOA details certain interactions among RL, EH-1, and EM-1 as well as their respective roles and responsibilities for implementation of the regulatory approach.

The authority of the RU to regulate the TWRS Privatization Contractor is derived solely from the terms of the TWRS Privatization Contract. Its authority to regulate the Contractor on behalf of DOE is derived from the Policy. The characteristics and scope of this special regulatory approach (special in the sense that it is based on terms of a contract rather than formally promulgated regulations) are delineated in the MOA, the TWRS Privatization Contract, and the following four documents, which are incorporated into the Contract and are part of the MOA.

> *Concept of the DOE Regulatory Process for Radiological, Nuclear, and Process Safety for TWRS Privatization Contractors*, DOE/RL-96-0005
>
> *DOE Regulatory Process for Radiological, Nuclear, and Process Safety for TWRS Privatization Contractors*, DOE/RL-96-0003
>
> *Top-Level Radiological, Nuclear, and Process Safety Standards and Principles for TWRS Privatization Contractors*, DOE/RL-96-0006
>
> *Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization*, DOE/RL-96-0004

Regulation by the RU in no way replaces any legally established external regulatory authority to regulate in accordance with their duly promulgated regulations nor relieves the Contractor from any

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obligations to comply with such regulations or to be subject to the enforcement practices contained therein.

In the execution of the regulatory approach through its regulatory program, DOE expects the RU to consider not only the relevant approaches and practices of DOE but also those of the Nuclear Regulatory Commission (NRC). The Policy states that

"It is DOE's policy that TWRS privatized contractor activities be regulated in a manner that assures adequate radiological, nuclear, and process safety by application of regulatory concepts and principles consistent with those of the Nuclear Regulatory Commission."

To this end, the RU interacts with the NRC (under the provisions of a memorandum of understanding with the NRC) during development of regulatory guidance and during execution of the regulatory program to ensure implementation of this policy

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1.0 INTRODUCTION

The Contract[1] requires that BNFL submit to the Regulatory Unit (RU) for review and comment a "a generic detailed description of the design safety features that will be incorporated into the waste treatment facility design." The scope and content of the Design Safety Features (DSF) deliverable are defined in the Agreement[2] between the Director of the RU and the General Manager of BNFL Inc. Based on this Agreement, the RU will review the submittal and provide comments 45 days after its receipt.

The Agreement requires that BNFL provide two categories of information. The first, Category 1, is a set of descriptions of the SSCs important to safety and the associated DSFs planned for the facility (DSFs are defined in the Agreement as those aspects of an important to safety SSC that give assurance that it will perform its safety function). The second, Category 2, is 10 examples of BNFL's detailed implementation of the DOE/RL-96-0004 standards selection process[3], using BNFL's implementing standards for Safety Standards and Requirements Identification[4] and Defense in Depth.[5]

The purpose of the DSF submittal is to develop confidence that the Contractor's work is proceeding so as to produce an adequately safe TWRS-P design and an acceptable Construction Authorization Request.

2.0 PURPOSE

This Handbook describes the Office of Radiological, Nuclear and Process Safety Regulation for TWRS-P Contractors (Regulatory Unit, [RU]) methodology for reviewing the BNFL Inc. (BNFL) Design Safety Features submittal. This methodology includes:

- Review Team Charter
- Review Team Roles and Responsibilities
- Review Schedule
- Reviewer Selection and Qualifications
- Reviewer Orientation
- Review Process Description
- Review Documentation

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[1] Contract No. DE-AC06-96RL13308, Section C, Standard 4, p. 58

[2] DOE Letter, 98-RU-0329, "Scope and Content for Design Safety Features Deliverable, October 22, 1998.

[3] *Process for Establishing a set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization*, DOE/RL-96-0004, Revision 1, July 1998.

[4] *TWRS-P Safety Requirements Document*, BNFL-5193-SRD-01, Appendix A, Revision 2, December 2, 1998.

[5] *TWRS-P Safety Requirements Document*, BNFL-5193-SRD-01, Appendix B, Revision 2, December 2, 1998.

- Lessons-Learned Development.

The review instructions in this document have been developed to structure the review in accordance with the requirements of the Contract as well as the Agreement on Scope and Content of the submittal. In case of conflict, the Contract provisions supercede these instructions. A copy of the BNFL contract is available for the team members in the RU Library for reference. Any Review Team member who identifies provisions of the review instructions that conflict with the Contract should promptly notify the Review Team Leader (RTL).

3.0 REVIEW TEAM CHARTER

The Contract requires that the RU review and comment on the BNFL submittal. The Agreement requires that the RU provide comments to BNFL within 45 days from date of receipt of 20 copies of the submittal. In performing this review, the Team shall use the review approach provided herein. At the conclusion of this review, the RTL, in consultation with other team members, shall prepare and submit to the Regulatory Official, a report incorporating any comments developed as a result of the review, in a form suitable for transmission to BNFL.

Team members should become familiar with the contents of this handbook and *The Agreement on Scope and Content for the Design Safety Features Deliverable* and conduct the review accordingly. Team members are encouraged to use their experience and professional judgment.

Upon completion of each team member's review, written proposed comments are communicated to the RTL by the team member in his/her area of responsibility. Documentation of the comments should be timely, clear, and concise. The RTL will integrate the comments to assure that the final set of comments is self-consistent and consistent with the Agreement. The RTL will submit the report to the Regulatory Official (RO).

4.0 ROLES AND RESPONSIBILITIES

4.1 REGULATORY UNIT OFFICIAL

The Regulatory Official (RO [Dr. D. C. Gibbs]):

- Approves the Design Safety Features Review Handbook (this document)
- Assigns the RTL for the Design Safety Features review
- Approves the reviewers from the RU staff, the DOE complex, and other qualified contractors
- Ensures independence of team members from the TWRS Program Official

- Approves the report prepared by the Team and signs the letter of transmittal to BNFL.

4.2 REVIEW TEAM LEADER

The Review Team Leader (RTL [N. Kaushal]):

- Identifies potential Team members and recommends Team composition to the RO
- Organizes and directs the review in accordance with this Handbook, DOE policy for the RU's activities, and RU Management Directives
- Provides logistical support to the Team in accordance with this handbook
- Communicates Team questions to the TWRS-P Contractor concerning the submittal
- Organizes Team member orientation
- Develops review area assignments
- Briefs the RO on progress of the review, emphasizing significant issues identified
- Directs reviewers in the preparation of the comments and prepares the final report
- Identifies "lessons learned" with the Team at the conclusion of the review.

4.3 ASSISTANT TEAM LEADER

The Assistant Team Leader (ATL [R. Griffith]):

- Coordinates and monitors individual reviewer progress
- Reports Team progress to the RTL
- Organizes and conducts team meetings to review significant issues and progress
- Organizes the preparation of assigned portions of the Report
- Prepares and maintains a public records file
- Collects, edits, and collates Team questions concerning the submittal and provides them to the RTL.

4.4 REVIEW TEAM ADMINISTRATIVE ASSISTANTS

The Review Team Administrative Assistant (Ms. M. D. Hopkins/Mr. C. Ungerecht):

- Provides clerical, logistic, and administrative support to the Team, as assigned.

4.5 REVIEW TEAM MEMBERS

The Team Members:

- Prepare for the review by attending orientation, or alternatively, by self-study of the reference material provided by the RTL
- Use the review instructions (as provided in this document), the DSF submittal, and applicable references to perform the review
- Provide the RTL, or the ATL, status reports as requested
- Provide written material to the RTL or the ATL in accordance with the review schedule and in the required format (see Sections 7.0 and 8.0)
- Provide input concerning potential weaknesses in the submittal to the ATL, or the RTL, in the Team meetings. This input should be in the format described in Section 8
- Resolve questions identified by the Team through discussion in meetings with TWRS-P Contractor personnel
- Document the rationale for the his/her resolution of questions. The rationale must address the acceptability of the TWRS-P Contractor's response to the questions
- Assist in the preparation of the Report, as assigned by the RTL
- Participate in the "lessons learned" session at the conclusion of the review.

5.0 SCHEDULE

5.1 MAJOR MILESTONES

The activities, activity duration, and milestones for the review of the BNFL submittal are shown in Table 1 below. The dates listed have been chosen to support the 45-day schedule required by the Agreement.

The formal review of the DSF submittal is scheduled to begin on February 25, 1999, and the review must be completed by April 5, 1999, in order to transmit the Report to BNFL by April 12, 1999.

Dates	Activity
2/23/99	Review team orientation - start
2/24/99	BNFL provides the DSF submittal to the RU
2/25/99	Start review
3/5/99*	Comments/questions due to ATL/RTL
3/12/99*	Comments/questions due to ATL/RTL
3/19/99*	Comments/questions due to ATL/RTL
3/23/99	Meet with BNFL to discuss comments/questions
4/5/99	Finalize review comments, Team review complete.
4/9/99	Finalize report, prepare transmittal letter
4/12/99	Report approved and transmittal letter issued

Figure 1, Table 1: Schedule of Activities

**Comments shall be provided to the RTL as they are developed. Comments developed during the week are due to the ATL by COB Friday of that week.

5.2 REVIEWER SELECTION AND QUALIFICATIONS

Each Team member will complete the one-page "Reviewer Credential Record" (Form 1), addressing his/her education, work experience, licenses, certifications, special skills, awards, and areas of expertise. All reviewers must also submit an "RU Nondisclosure/ Disclosure Agreement" (Form 2). Federal Employees are not required to complete the Nondisclosure portion of Form 2. (Note: If forms 1 and 2 are already on file from a previous review, the reviewer does not need to complete new forms.)

The RTL will assign each reviewer to predetermined review areas based upon previous work experience with the RU, the Reviewer Team Credential Records, and any available supervisor recommendations. The preliminary review assignments are provided in this document. (Some changes in the assignments may occur after the submittal has been received, to address the specific contents of the submittal.)

6.0 REVIEWER ORIENTATION

6.1 GENERAL

All reviewers are required to become familiar with the following documents prior to February 22, 1999. Documents that are essential to a complete understanding to the review process are listed in **bold** and

must be fully understood by all reviewers. The other listed documents provide further amplification of the regulatory process and will enhance the knowledge of the reviewers.

- Top-Level Radiological, Nuclear, and Process Safety Standards and Principles for TWRS Privatization Contractors, DOE/RL-96-0006, Revision 0, February 1996.

- Concept of the DOE Regulatory Process for Radiological, Nuclear, and Process Safety for TWRS Privatization Contractors, DOE/RL-96-0005, Revision 0, February 1996.

- **Scope and Content for Design Safety Features Deliverable, DOE letter 98-RU-329, October 22, 1998.**

- **Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization, DOE/RL-96-0004, Revision 0, February 1996.**

- **Regulatory Unit Position on Tailoring for Safety, RL/REG-98-17, Revision 1, September 11, 1998**

- **BNFL Implementing Standard for Safety Standards and Requirements Identification and BNFL Implementing Standard for Defense in Depth; TWRS-P Safety Requirements Document, BNFL-5193-SRD-01, Revision 2, December 2, 1998, Appendix A and Appendix B**

- TWRS-P Safety Requirements Document, BNFL 5193-SRD-01, Revision 2, December 2, 1998.

- TWRS-P Initial Safety Analysis Report A-4, BNFL-5193-ISAR-01, Revision 0, January 12, 1998

- Memorandum of Agreement for the Execution of Radiological, Nuclear, and Process Safety Regulation of TWRS Privatization Contractors, DOE/RL-96-26, Revision 0, July 3, 1996.

- Memorandum of Understanding between the Nuclear Regulatory Commission and the Department of Energy, January 29, 1997.

- Policy for Radiological, Nuclear, and Process Safety Regulations for TWRS Privatization Contractors, DOE/RL-96-25, Revision 0, July 3, 1996.

Reviewer orientation will consist of a summary review of the regulatory concepts and principles, as described in the required reading documents. The orientation session is scheduled for Monday, February 22, 1999, from 8 to 10 AM (Federal Building, Room TBD). During the orientation, the Team will make final preparations for the review of the DSF submittal, which will commence Thursday,

February 25, 1999. Team members who are unable to attend the orientation must study this handbook and the review instructions documents, and contact the RTL or ATL with questions prior to their arrival.

7.0 INSTRUCTIONS TO REVIEWERS

7.1 REVIEW PURPOSE AND APPROACH

The purpose of the review is to make an early assessment regarding BNFL's approach to safety in design. This will be accomplished by a preliminary assessment of the set of important to safety (ITS) systems, structures, and components (SSCs) provided under Category 1 information in the DSF submittal and assessing the Integrated Safety Management Process as implemented by BNFL in the ten examples included in Category 2 information.

7.2 CATEGORY 1 REVIEW OBJECTIVE

The objective of reviewing Category 1 information is to develop confidence that the set of ITS SSCs and DSFs identified by BNFL will be adequate once the preliminary design is completed. Therefore, the specific objectives of this part of the review are to determine if:

- The proposed SSCs and DSFs address identified hazards throughout the facility
- The proposed SSCs and DSFs include ITS support systems
- The set reflects design conservatism
- The set considers the defense-in-depth criteria in the SRD (including defense-in-depth implementing standards)
- The set has the potential to adequately control the identified hazards.

7.3 CATEGORY 2 REVIEW OBJECTIVE

The objective of reviewing Category 2 information is to develop confidence that BNFL understands the Contract-stipulated Integrated Safety Management (ISM) process and that the process was applied appropriately in the examples BNFL provided. This review assesses the decision-making used in the selection of ITS SSCs and DSFs. It assesses the adequacy of the basis for the selected SSCs and DSFs. The objectives of this part of the review are to assess if:

- The work was being adequately defined

- Hazards were being adequately evaluated
- Control strategies were being adequately selected
- SSCs were being adequately defined
- DSFs for the SSCs were being adequately defined.

7.4 OVERALL REVIEW APPROACH

The review approach is for the reviewers to address a set of specific questions associated with each of the objectives listed in Sections 7.2 and 7.3 using the information in the BNFL DSF submittal. These questions, provided in Sections 7.4.1.2 and 7.4.2.2, are not required by the Agreement to be explicitly addressed by BNFL in the submittal. These questions are provided here to guide the reviewers' thought process for performing the review and are by no means all-inclusive. Reviewers can use their professional experience and judgement. Conclusion/comments may be formulated based on consideration of each question individually. Based on these specific comments/conclusions, an overall conclusion can be formulated (by each reviewer, or principal reviewer) for each of the individual review objectives. These results will be further combined to generate overall conclusions on-

(1) Adequacy of ITS SSCs (Category 1 review)

(2) Adequacy of the ISM process (Category 2 review).

The submittal provided by BNFL is based on work in progress. The review of this submittal is not a formal regulatory action (approval or authorization). Therefore, consistent with the purpose of the review, the reviewer should assess BNFL's progress towards an adequately safe design.

7.4.1 Category 1 Review

In this section, a set of questions is provided for each of the Category 1 review objectives. The questions are provided to assist the reviewer in conducting the review. The reviewer may formulate additional questions to address the objectives. Further, the reviewers are expected to formulate a conclusion for each review objective.

7.4.1.1 Expected Category 1 Information

In accordance with the Agreement, Category 1 information is comprised of:

- Important to Safety (ITS) SSCs that are known or expected

- SSCs that have not been classified as ITS but are reasonably likely to be so classified
- DSFs that are considered likely
- Description of the interrelationship of the safety features for each ITS SSC.

Clarifications on the submitted information can be sought through questions generated by the reviews and submitted to BNFL early in the review process (see Section 7.7.2) for specific details of the question and answer process).

7.4.1.2 Category 1 Review Questions

The set of SSCs and DSFs addresses identified hazards throughout the facility[6]

1. Does the set generally address TWRS-P hazards and events?[7,8]
2. Does the set include SSCs and DSFs from the 10 examples in Category 2?
3. Does the set address external and internal events?
4. Does the set address normal operations and accidents?

The set includes ITS support systems

1. Is there recognition of necessary ITS support systems?
2. Are SSCs and DSFs defined for ITS support systems?

The set reflects design conservatism

1. Does the set of SSCs and DSFs indicate accommodation of current uncertainties in design and hazards in accordance with the SRD?[9]
2. Does the set of SSCs and DSFs indicate that features have been included that enhance the margin of safety in accordance with the SRD?[10]
3. Does the set of SSCs and DSFs include measures to enhance the reliability of barriers in accordance with the SRD?[11]

[6] The evolving TWRS-P design may be substantially different, in certain areas, than that on which the HAR is based. Reviewers should use the HAR for a general sense of the types and significance of the hazards associated with the eventual design.

[7] *Tank Waste Remediation System Privatization Project Hazards Analysis Report*, BNFL-5193-HAR-01, Revision 0, September 26, 1997.

[8] *TWRS-P Initial Safety Analysis Report*, BNFL-5193-ISAR-01, Revision 0, Section 4.8, January 12, 1998.

[9] *TWRS-P Safety Requirements Document*, BNFL-5193-SRD-01, Rev.2, Safety Criterion 2.0-1, Note 3.

[10] Margin of Safety is discussed in *TWRS-P Safety Requirements Document*, BNFL-5193-SRD-01, Rev. 2, Safety Criterion 4.1-2, Safety Criterion 4.4-4, and Sections 2.1.2, 2.2.2, 2.3.2 of Appendix A.

[11] *TWRS-P Safety Requirements Document*, BNFL-5193-SRD-01, Rev. 2, Section 4.2, Confinement Design.

The set considers defense-in-depth criteria in the SRD (including implementing standards)

1. Is the set of SSCs consistent with BNFL's defense-in-depth standard?
2. Are the DSFs consistent with BNFL's defense-in-depth standard?

The set has the potential to adequately control the identified hazards

1. Are the SSCs and DSFs generally consistent with proven practices[12] for the control of radiological, nuclear, and process hazards/accidents of the type inherent in the TWRS-P facility?

7.4.1.3 Adequacy of ITS SSCs

The RU DSF RTL is responsible for combining the comments from the Category 1 review into conclusions on the adequacy of ITS SSCs.

7.4.2 Category 2 Review

In this section, a set of questions is provided for each of the Category 2 review objectives. The questions are provided to assist the reviewer in conducting the review. The reviewer may formulate additional questions to address the objectives. Further, the reviewers are expected to formulate a conclusion for each review objective. Identical reviews are intended for each of the 10 examples in the BNFL submittal.

7.4.2.1 Expected Category 2 Information

In accordance with the Agreement, Category 2 information for each of the 10 examples is comprised of:

- Identification of the hazard/accident and methodology used
- Identification of hazard control strategies and selection/definition approach
- Features/provisions required to implement the hazard control strategy
- SSCs relied upon to assure the required safety functions
- DSFs for the selected SSCs

[12] *Top-Level Radiological, Nuclear, and Process Safety Standards and Principles for TWRS Privatization Contractors*, DOE/RL-96-0006, Revision 1, July 1998, Section 4.2.2.

- Process for selecting DSFs.

Clarifications on the submitted information can be sought through questions generated by the reviewers and submitted to BNFL early in the review process (see Section 7.7.2) for specific details of the question and answer process).

7.4.2.2 Category 2 Review Questions

The work is being properly defined

1. Is the work defined in accordance with BNFL's Implementing Standard for Safety Standards and Requirements Identification?[13]

2. Is sufficient information provided for understanding and evaluating the hazard?

3. Is sufficient information provided for understanding and evaluating the event/accident?

4. Is sufficient information provided for understanding the process and facility context?

Hazards are being properly evaluated

1. Are the hazard and accident identified and evaluated in accordance with BNFL's *Implementing Standard for Safety Standards and Requirements Identification*?[14]

2. Is the hazard clearly identified, defined, and quantified?

3. Is the hazardous event/accident clearly identified, defined, and quantified?

4. Is the methodology used for consequence estimation appropriate?

5. Is the methodology used for frequency estimation appropriate?

6. Are assumptions clearly stated?

7. Are unmitigated frequency estimates appropriate?

[13] *Implementing Standard for Safety Standards and Requirements Identification, TWRS-P Safety Requirements Document*, BNFL-5193-SRD-01, Appendix A, Rev.2.

[14] *Implementing Standard for Safety Standards and Requirements Identification, TWRS-P Safety Requirements Document*, BNFL-5193-SRD-01, Appendix A, Rev.2.

8. Are unmitigated consequence estimates for workers and public appropriate?

9. Are uncertainties estimated for unmitigated frequencies and consequences?

Control strategies are being properly selected

1. Is the strategy defined in accordance with BNFL's Implementing Standard for Safety Standards and Requirements Identification?

2. Is the evaluation of control strategy options logical?

3. Is the preferred control strategy clear and defensible?
4. Is the preferred control strategy consistent with BNFL's defense-in-depth standard?[15]

5. Is the preferred control strategy consistent with the Top-Level Safety Standards and Principles?[16]

6. Does the preferred strategy indicate accommodation of current uncertainties in design and hazards in accordance with the SRD?[17]

The set of SSCs is generally consistent with adequate control of the identified hazards

1. Are SSCs defined in accordance with BNFL's Implementing Standard for Safety Standards and Requirements Identification?

2. Is the set of SSCs generally complete?

3. Are safety functions and requirements for the SSCs defined?

4. Are the design concepts for SSCs adequate?

5. Are sufficient SSCs defined for support systems?

6. Does the set of SSCs indicate accommodation of current uncertainties in design and hazards in accordance with the SRD?[18]

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[15] *TWRS-P Safety Requirements Document*, BNFL-5193-SRD-01, Appendix B, Rev.2.

[16] *Top-Level Radiological, Nuclear, and Process Safety Standards and Principles for TWRS Privatization Contractors*, DOE/RL-96-0006, Revision 1, July 1998.

[17] *TWRS-P Safety Requirements Document*, BNFL-5193-SRD-01, Rev.2, Safety Criterion 2.0-1, Note 3.

[18] *TWRS-P Safety Requirements Document*, BNFL-5193-SRD-01, Rev.2, Safety Criterion 2.0-1, Note 3.

7. Does the set of SSCs indicate that features have been included that enhance the margin of safety in accordance with the SRD?[19]

8. Does the set of SSCs include measures to enhance the reliability of barriers in accordance with the SRD?[20]

DSFs for the SSCs are being properly defined

1. Are DSFs defined in accordance with BNFL's Implementing Standard for Safety Standards and Requirements Identification?

2. Are the DSFs described as a set for each SSC?

3. Are the DSFs sufficient to provide requisite availability and reliability of the SSCs?

4. Are DSFs defined for support systems?

5. Does the set of DSFs indicate accommodation of current uncertainties in design in accordance with the SRD[21]

6. Does the set of DSFs indicate accommodation of current uncertainties in identification and evaluation of hazards/events in accordance with the SRD?[22]

7. Does the set of DSFs indicate that features have been included that enhance the margin of safety in accordance with the SRD?[23]

8. Does the set of DSFs include measures to enhance the reliability of barriers in accordance with the SRD?[24]

[19] Margin of Safety is discussed in *TWRS-P Safety Requirements Document*, BNFL-5193-SRD-01, Rev.2, Safety Criterion 4.1-2, Safety Criterion 4.4-4, and Sections 2.1.2, 2.2.2, 2.3.2 of Appendix A.

[20] *TWRS-P Safety Requirements Document*, BNFL-5193-SRD-01, Rev.2, Section 4.2, Confinement Design.

[21] *TWRS-P Safety Requirements Document*, BNFL-5193-SRD-01, Rev.2, Safety Criterion 2.0-1, Note 3.

[22] *TWRS-P Safety Requirements Document*, BNFL-5193-SRD-01, Rev.2, Safety Criterion 2.0-1, Note 3.

[23] Margin of Safety is discussed in *TWRS-P Safety Requirements Document*, BNFL-5193-SRD-01, Rev.2, Safety Criterion 4.1-2, Safety Criterion 4.4-4, and Sections 2.1.2, 2.2.2, 2.3.2 of Appendix A.

[24] *TWRS-P Safety Requirements Document*, BNFL-5193-SRD-01, Rev.2, Safety Criterion 4.2-3.

7.4.1.3 Category 2 Conclusions

The RU DSF RTL is responsible for combining the results from the 10 reviews to generate integrated conclusions for each objective.

7.4.1.4 Adequacy of the ISM Process

The RU DSF RTL is responsible for combining the comments from the Category 2 reviews into an overall conclusion on adequacy of the ISM process.

7.5 CONCLUSIONS

The RU DSF RTL is responsible for combining the conclusions for the adequacy of ITS SSCs and the adequacy of the ISM process. In accordance with the purpose of this review, an overall conclusion will be generated on the degree to which BNFL appears able to produce an adequately safe TWRS-P design and an acceptable Construction Authorization Request. Any follow-up actions by the RU or by BNFL will be identified.

7.6 TEAM ORGANIZATION

Organization of the Review Team and roles and responsibilities of review participants are in Appendix A.

7.7 COMMENTS/QUESTIONS/INPUT STYLE GUIDE

Each reviewer is expected to provide Questions or Comments on the DSF submittal to the ATL. The reviewers may also provide proposed general conclusions. These conclusions must be directly based on (and supported by) the comments provided by the reviewer.

7.7.1 Comments

All comments must fall in one of the following four classifications (Type A, B, C, or D).

The following two types (A or B) apply to both category 1 and Category 2 information.

Type A: The material provided does not meet the expectations from the scope and content document. All such comments pertaining to the adequacy of the submittal should refer to the specific requirement from the Scope and Content document. Reviewers shall provide the

exact reference and a brief explanation of why the comment is appropriate in terms of the requirement from the Scope and Content document. The comment and reference should be in a form that can be included in the final report or any other transmittal to BNFL.

Type B: There is inconsistency between the material provided and governing regulatory documents and/or other previous BNFL commitments (such as in the SRD) without an acceptable explanation. Reviewers shall provide exact reference to the appropriate commitment or other regulatory requirement and an explanation of how the information in the submittal is inconsistent.

The following two types of comments apply to Category 2 information only.

Type C: The process followed for developing control strategies and standards identification is inconsistent with the ISM process required by the contract. This is not expected to be not the case. However, if this does happen, it must be identified within the first week so BNFL can rectify the situation if at all possible within the review schedule.

Type D: The Reviewer has a technical concern regarding the adequacy or accuracy of the supporting technical analysis. Explain clearly why the technical analysis is considered inadequate or inaccurate. Refer to specific analysis provided in the submittal.

7.7.2. Questions

The review process does not provide for written questions and answers. However, informal responses to questions can be obtained in meetings with BNFL or over the telephone. In order to get responses to questions early enough to be useful for the review, questions need to be formulated and communicated to BNFL within the first three weeks. Questions should be communicated to the ATL (or in his absence to the RTL) as soon as they arise. These questions will be informally communicated to BNFL with the expectation of receiving expeditious telephone responses. There will be opportunities for informal meetings with BNFL to discuss these questions/responses.

The objective of these questions should be only to elicit explanatory information regarding the material already provided in the submittal so as to facilitate its further review. Deficiencies in the DSF submittal (as to its content) and deficiencies in BNFL approach to design are more appropriately handled as comments rather than questions. Such comments should be provided with references to appropriate requirements (see comment types A and B).

7.7.3 General Considerations for Review

Comments regarding improving the language of the submittal are not necessary. There is no intent to maintain this document after its submission. BNFL is not expected to produce a revised and updated version.

The information contained in the submittal is not intended to be made part of the authorization basis. It is subject to change as the design develops without prior approval by the RU. In particular, the information contained in Category 1 is likely not the final design, but rather in most cases is BNFL's current estimate. BNFL is not expected to have available a full justification for this Category 1 information, except for the information based on Category 2 work.

For Category 2 information, the Agreement calls for "Design Basis Event (DBE) descriptions and justifications that these DBEs envelope known safety concerns" (Item 4, page 2 of the Agreement). However, the RU recognizes that final definition of DBEs is not expected at this stage of the design. For the DSF submittal, BNFL is required to include (for the ten Category 2 examples), events that span a range of occurrence frequencies and severity of consequences. BNFL is also expected to include discussion of how the selection of specific events (for the ten Category 2 examples) is appropriate.

7.7.4 Format for Comments

Each reviewer must identify the comment as one of the four types (A, B, C, or D) identified in Section 7.7.1 and must provide the basis of the comment and explanation as required.

Each principal reviewer (see Appendix A) will be responsible for compiling all comments on the Category 2 item he or she is responsible for. Comments should be arranged by information category (Category 1 or 2), specific Category 2 example, and each of the four types (A, B, C, or D) of comments identified here. All comments should be prepared as a text file in Word 97 format and provided to the principal reviewer in paper and electronic format. The principal reviewer is expected to aggregate comments from other reviewers in his/her area, resolve any inconsistencies, and provide these comments to the Review Team Leader in paper as well as electronic format. Form 3 should be used to make sure all information is included. (See also Section 8.2 for related document format.)

7.8 DIFFERING PROFESSIONAL OPINION/DIFFERING PROFESSIONAL VIEW PROCEDURE

RL policy and procedure titled "Resolution of Differing Professional Views and Opinions: Policy and Procedure," RLPD 3401, provides a mechanism for the resolution of technical concerns that a Team member considers to have been inadequately resolved by the Team. Team members are encouraged to

work constructively with the other team members to resolve technical differences of opinion so that all team members are satisfied with the resolution. In the event this is not satisfactory to all team members, the DPO/DPV procedure ensures technical concerns are fully reviewed by RL with no retaliation or discrimination against the concerned reviewer.

8.0 DOCUMENTATION

8.1 FINAL REPORT

The Review Team Leader is responsible for preparing the DSF submittal review report (DSF report) in consultation with other members of the review team. The report is expected to include the following sections:

- Introduction describing the background history of the submittal
- Description of the review process
- Summary of the reviewer comments developed in the review
- Conclusions from the review
- Recommendations for follow-up actions
- Appendix including final comments from the reviewers.

8.2 DOCUMENTATION FORMAT

Team members are expected to provide their comments/conclusions in a manner conducive to easy incorporation with other contributors' documentation and the final report. Team members shall use Microsoft Word, Office '97, for IBM compatibles. Individual contributors shall provide a hard copy of their input along with their electronic data. This hard copy should be double-spaced and singled-sided.

8.2.1 Text Style

The majority of the DSF report should be in active voice and past tense. The report should flow from the review comments. All review comments do not need to be addressed; however, every consideration addressed should be discussed.

Each Team member should prepare his/her documentation consistent with the RU Style Guide manual (a copy of which is supplied in the Orientation Packet). Use of spell checkers, grammar checkers, as well as proof-reading by other team members is highly encouraged to enhance the readability and coherence of the DSF report.

8.2.2 Margins/Page Settings

Use the software default settings for margins. Do not adjust top, bottom, left, or right margins. Margin adjustments shall be made on the final document.

Do not use headers or footers. Page numbering can be used when drafting the written text. However, they should be removed before submitting text for final incorporation.

8.2.3 Font and Font Features

- Use font Times New Roman, 12 in Word.

- Use *italics* when spelling out the title of a complete document (e.g., *DOE Regulatory Process for Radiological, Nuclear and Process Safety for TWRS Privatization Contractors*, DOE/RL-96-0003), and "quotation marks" when spelling out the name of chapters or sections. DOE Orders and Standards are also to be spelled out using quotation marks.

8.2.4 Headings/Table of Content Markings/Outlines

Do **not** use Heading, Table of Content, or Outline markings in either Word or WordPerfect. Headings and heading numbers can be typed, but not marked. Do not number sections or subsections. Include any numbering information in parenthesis as part of the text.

8.2.5 Footnotes and Endnotes

Footnotes are provided for the reader as a quick reference point or explanation and should be used as needed to better clarify the text. Footnote markings are identified numerically.

Endnotes are used for the writer as a means to recall reference information, etc. Endnote markings are identified alphabetically.
Include footnotes and endnotes as part of the text enclosed within parenthesis. These will be converted into footnotes etc. during word processing.

8.2.6 Tables and Figures

Tables and figures may be used as approved by the Review Team Leader or Assistant Team Leader. However, tables and figures should be provided as separate files and not embedded within the written text.

The Review Team Leader (RTL) will amplify the schedule in this handbook to indicate when draft DSF Report inputs will be required, and who will be the lead writer for each input. Due to the potentially short time period of this review, Team members must meet the documentation schedule that is developed and mutually agreed upon. All Team members are encouraged to advise the ATL or RTL of any constraints on their ability to complete their DSF Report inputs in a timely manner, before the final schedule is developed.

8.2.7 Indents and Bullets

Do not indent or bulletize, just use new paragraphs to clarify. If you would like the text to indented or bulletized, provide appropriate instructions for the Word Processor or Technical Editor.

9.0 LESSONS LEARNED

At the conclusion of the review, a lessons learned session will be held, with solicitation of input from all who participated in the review. Significant results of the session will be documented and provided to the RO and the Team members.

10.0 FOLLOW UP ACTIONS

Any follow up actions resulting from the DSF review shall be incorporated into the appropriate tracking systems. Actions required by the RU shall be included in the RU's Action Tracking System. Actions expected from BNFL shall be communicated to BNFL and upon commitment by BNFL shall be included in the Commitment Tracking System.

Figure 2, Form 1: Reviewer Credential Record

Office of Radiological, Nuclear, and Process Safety Regulation of the TWRS-P Contractor	**REVIEWER CREDENTIAL RECORD**
Name:	Date:
Organization/Address	Telephone:
Areas of Expertise:	
Education (Degree/Major/School/Date):	
Licenses, Certifications, Special Skills, & Awards (License/Organization/Number/Date):	
Work Experience (Summarize):	
Reviewer's Signature	Date:
Regulatory Official Certification:	Date:

Figure 3,Form 2: Nondisclosure and Disclosure Statements

Office of Radiological, Nuclear, and Process Safety Regulation of the TWRS-P Contractor	**NONDISCLOSURE AND DISCLOSURE STATEMENTS**
Name:	Date:
Organization/Address:	Telephone:

Nondisclosure Statement

In anticipation of my participation with the Office of Radiological, Nuclear, and Process Safety Regulation for TWRS-P Contractors (RU), I certify that I will not disclose any proprietary or competition sensitive information of the Contractors or DOE, to anyone who is not also authorized access to the information by law or regulation, except pursuant to the order of a court of competent jurisdiction.

Signature: Date:

Disclosure Statement

Identify any direct financial interests (including stocks, bonds, or other financial interests) in, or past employment by the following companies (company - interest or employment dates):

BNFL, Inc.

- BNFL Engineering Ltd.
- Science Application International Corp.
- Savannah River Technical Center.
- BNFL Inc.
- Bechtel National, Inc.
- GTS Duratek

Signature: Date:

Figure 4, Form 3: Regulatory Unit Review Team Comments or Questions (for the contractor)

Office of Radiological, Nuclear, and Process Safety Regulation of the TWRS Privatization Contractor	**Regulatory Unit Review Team Question or Comment Form**

Date:

Reviewer:

Question/Comment #

Information Category (1 or 2)

Category 2 Example:

Comment Type (A, B, C, or D):

Cited Reference:

Cited Submittal Text:

Question or Comment:

Explanation/Discussion

Appendix A

Design Safety Features Submittal Review
Team Organization

Overall Review and Integration:	Kaushal, Griffith, Boudreau
Overall Review for ISM:	Bell**
General Review:	Miller, Barr
Review of Category 1 Information:	Boudreau, Cunnane, Kaushal, Griffith, Hull*

Review of Category 2 Information: The principal responsibility for review of each of the ten examples in Category 2 information is indicated below. These principal reviewers are expected to seek additional review from other members of the team. As a general rule of thumb, at least three reviewers should review each Category 2 item. Additional reviews from outside the team may be obtained after consultation with the Review Team Leader.

Hydrogen Generation in HLW Receipt Tank	Jim Goss
Pretreatment Pump Drop	Boudreau
Cooling Water Contamination	Griffith
Sampling Accident	Goss
LLW Transfer Line Breach	Hardwick
HLW Feed Line Rupture	Hardwick
Nitric Acid Handling Accident	Goss
Cesium Tank Boiling	Kennedy
Receipt Tank Rupture	Kennedy
Backflow from Process Tank into the Cabinet	Griffith
All ten examples	Hull *

* Mr. Hull will act as the principal reviewer from EH and will seek other support from EH as necessary.

Functional and consultation/review support, as requested by the principal reviewers, will be available as follows:

Nuclear Process Chemistry	Liu, Cunnane, Harlow (HQ), Gilbert
Criticality	Vonderfecht, McKamy (HQ)
Probabilistic Risk Analysis	Vonderfecht
Fire Protection	Christianson, Kubicki (HQ)
Electrical	Eilertson (COE), Guha (HQ)
Mechanical/Structural	Miller (COE), K. Chen
Fluid Systems	Yedidia
Civil Structural	Porter (COE)
Source Term Transport	Kennedy
Source Term	Moeller
Rad. Protection	Bocanegra, Bradley

**Available for direct support of the Review Team Leader only.

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